Focus on IMO

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October 1998

MARPOL - 25 years

The International Convention for the Prevention of Pollution from Ships (MARPOL) was adopted on 2 November 1973 following a conference at the London headquarters of the International Maritime Organization, the United Nations agency responsible for the safety of shipping and the prevention of marine pollution.

The adoption of the Convention, 25 years ago, was a crucial stage in an ambitious project to deal with vessel-source pollution. The convention adopted in 1973 covered pollution by oil, chemicals, harmful substances in packaged form, sewage and garbage.

The conference which adopted MARPOL, was held against a background of increased global awareness of the need to protect the environment. The United Nations Conference on the Human Environment held in Stockholm in June 1972 provided a global forum for discussions on the environment. In the same year, a London Conference adopted the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (LC), which controls the dumping of industrial and other wastes at sea by ships and aircrafts. [1]

The adoption of MARPOL on 2 November 1973 was clearly a significant move. As the London-based Oil Companies International Marine Forum (OCIMF) wrote in 1974:

"The 1973 Convention represents an historic and major step forward in the prevention of pollution from ships. It extends the existing restrictions upon operational pollution by oil and requires both equipment and design features in tankers and other ships, while also introducing controls against other forms of pollution from ships."[2]

But it was not all plain sailing. The Convention required ratification by 15 States, with a combined merchant fleet of not less than 50 percent of world shipping by gross tonnage, and by 1976, it had only received three ratifications - Jordan, Kenya and Tunisia - representing less than one percent of the world's merchant shipping fleet. This was despite the fact that States could become Party to the Convention by only ratifying Annexes I (oil) and II (chemicals). Annexes III to V, covering harmful goods in packaged form, sewage and garbage, were optional.

It began to look as though the Convention might never enter into force, despite its importance.

"There is no doubt that, were the [MARPOL] convention to come into force and be widely ratified, it would make a significant contribution to reducing pollution from ships. Unfortunately, however, it is making very slow progress at coming into force," wrote lawyer Robin Churchill, in the book "The Impact of Marine Pollution".[3]

In 1978, in response to a spate of tanker accidents in 1976-1977, IMO held a Conference on Tanker

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[1] IMO took over Secretariat functions for the London Convention when it entered into force in 1975

[2] MEPC II, Inf 10. Position of the Oil Companies International Marine Forum.

[3] Robin Churchill, The Role of IMCO, in The Impact of Marine Pollution, Edited by Douglas J. Cuisine and John P.Grant, 1980, Croom Helm Ltd, London.

Safety and Pollution Prevention in February 1978. The conference adopted measures affecting tanker design and operation, which were incorporated into both the Protocol of 1978 relating to the 1974 Convention on the Safety of Life at Sea (1978 SOLAS Protocol) and the Protocol of 1978 relating to the 1973 International Convention for the Prevention of Pollution from Ships (1978 MARPOL Protocol).

More importantly in terms of achieving the entry into force of MARPOL, the 1978 MARPOL Protocol allowed States to become Party to the Convention by first implementing Annex I (oil), as it was decided that Annex II (chemicals) would not become binding until three years after the Protocol entered into force.

This gave States time to overcome technical problems in Annex II, which for some had been a major obstacle in ratifying the Convention.

As the 1973 Convention had not yet entered into force, the 1978 MARPOL Protocol absorbed the parent Convention. The combined instrument is referred to as the 1973 International Convention for the Prevention of Marine Pollution from Ships, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78), and it finally entered into force on 2 October 1983 (for Annexes I and II).

Annex V, covering garbage, achieved sufficient ratifications to enter into force on 31 December 1988, while Annex III, covering harmful substances carried in packaged form, entered into force on 1 July 1992. Annex IV, covering sewage, has received 71 ratifications (at September 1998), representing 42.50 percent of world shipping tonnage.

In 1997, a new Annex VI on prevention of air pollution from ships was added. IMO's Marine Environment Protection Committee (MEPC) is now drafting mandatory regulations covering the management of ballast water to prevent the spread of unwanted aquatic organisms and the banning of anti-fouling paints that are harmful to the environment.

Despite the number of years it took for MARPOL to enter into force, the 1973 Conference which adopted the Convention laid the groundwork for IMO's future work on environmental issues, and its significance cannot be underestimated.

IMO's work in marine pollution prevention was recognised in 1997, when the Organization was awarded the prestigious Onassis Prize for the Environment.

The MEPC, which meets three times during every biennium, is an important forum for Governments, Inter-Governmental and Non-Governmental Organizations with an interest in protecting the marine environment from pollution by ships.

MARPOL remains a living document and is amended when necessary. More importantly, IMO is also concentrating its efforts on full implementation of MARPOL requirements by all Flag States and Port States.

The development of regulations in the different MARPOL annexes is outlined below.

MARPOL Annex I - Regulations for the Prevention of Pollution by Oil

Background

The world's first oil tankers appeared in the late 19th century and carried kerosene for lighting, but the invention of the motor car fuelled demand for oil. During the Second World War, the standard oil tanker was the T2, 16,400 tonnes deadweight, but tankers grew rapidly in size from the 1950s onwards. The first 100,000-tonne crude oil tanker was delivered in 1959.[4]

The potential for oil to pollute the marine environment was recognised by the International Convention for the Prevention of Pollution of the Sea by Oil, 1954 (OILPOL 1954). The Conference adopting the Convention was organised by the United Kingdom government, and the Convention provided for certain functions to be undertaken by IMO when it came into being. In fact, the IMO Convention entered into force in 1958 just a few months before the OILPOL convention entered into force, so IMO effectively managed OILPOL from the start, initially through its Maritime Safety Committee.[5]

The OILPOL Convention recognised that most oil pollution resulted from routine shipboard operations such as the cleaning of cargo tanks. In the 1950s, the normal practice was simply to wash the tanks out with water and then pump the resulting mixture of oil and water into the sea.

OILPOL 54 prohibited the dumping of oily wastes within a certain distance from land and in 'special areas' where the danger to the environment was especially acute. In 1962 the limits were extended by means of an amendment adopted at a conference organised by IMO.

Meanwhile, IMO in 1965, set up a Subcommittee on Oil Pollution, under the auspices of its Maritime Safety committee, to address oil pollution issues.

Torrey Canyon disaster

Although the OILPOL Convention had been ratified, pollution control was at the time still a minor concern for

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[4] The first 100,000-tonne crude oil tanker was delivered in 1959 to cover the route from the Middle East to Europe round the Cape of Good Hope (thereby avoiding the Suez Canal which had been temporarily closed following political conflicts in 1956). Shippers saw economies of scale in larger tankers and by the mid-1960s, tankers of 200,000 tonnes deadweight- the Very Large Crude Carrier or VLCC - had been ordered.

[5] IMO's twin objectives today are stated as "the safety of shipping and the prevention of marine pollution by ships", but marine pollution was not specifically mentioned in the original IMO Convention, adopted in 1948. In 1975, however, the IMO Assembly adopted amendments to the IMO Convention, changing its name from Inter-Governmental Maritime Consultative Organization (IMCO) to IMO and changing Article I by adding to the list of purposes "the prevention and control of marine pollution from ships; and to deal with legal matters related to the purposes set out in this Article." The amendments entered into force in 1982.

IMO, and indeed the world was only beginning to wake up to the environmental consequences of an increasingly industrialised society..

But in 1967, the **Torrey Canyon** ran aground while entering the English Channel and spilled her entire cargo of 120,000 tons of crude oil into the sea. This resulted in the biggest oil pollution incident ever recorded up to that time. The incident raised questions about measures then in place to prevent oil pollution from ships and also exposed deficiencies in the existing system for providing compensation following accidents at sea.

It was essentially this incident that set in motion the chain of events that eventually led to the adoption of MARPOL - as well as a host of Conventions in the field of liability and compensation.[6]

First, IMO called an Extraordinary session of its Council, which drew up a plan of action on technical and legal aspects of the **Torrey Canyon** incident. [7]

[6] The **Torrey Canyon** incident is also seen as the turning point for IMO as an Organization, to the extent that IMO went on to expand its activities in the environmental and legal fields.

[7] An ad-hoc Legal Committee was established, which later became a permanent subsidiary organ of the IMO Council. International Conventions on liability and compensation followed, including the International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (INTERVENTION), 1969; the International Convention on Civil Liability for Oil Pollution Damage (CLC), 1969; and the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND), 1971

It was still recognized, however, that although accidental pollution was spectacular, operational pollution was the bigger threat (see page 6). In 1969, therefore, the 1954 OILPOL Convention was again amended, this time to introduce a procedure known as 'load on top' which had been developed by the oil industry and had the double advantage of saving oil and reducing pollution. Under the system, the washings resulting from tank cleaning are pumped into a special tank. During the voyage back to the loading terminal the oil and water separate. The water at the bottom of the tank is pumped overboard and at the terminal oil is pumped on to the oil left in the tank. [8]

At the same time, the enormous growth in the maritime transport of oil and the size of tankers, the increasing amount of chemicals being carried at sea and a growing concern for the world's environment as a whole, made many countries feel that the 1954 OILPOL Convention was no longer adequate, despite the various amendments which had been adopted.

In 1969, the IMO Assembly decided to convene an international conference to adopt a completely new convention, which would incorporate the regulations contained in OILPOL 1954 (as amended). At the same time, the Sub-Committee on Oil Pollution was renamed the Sub-Committee on Marine Pollution, to broaden its scope, and this became the Marine Environment Protection Committee (MEPC), which was eventually given the same standing as the Maritime Safety Committee, with a brief to deal with all matters relating to marine pollution.

The conference was set for October-November 1973, and preparatory meetings began in 1970.

Meanwhile, in 1971 IMO adopted amendments to OILPOL 1954, which limited the size of cargo tanks in all tankers ordered after 1972. The intention was that given certain damage to the vessel, only a limited amount of oil can enter the sea.

1973 International Convention for the Prevention of Pollution from Ships

The 1973 conference in October-November 1973 was attended by representatives from 71 countries and resulted in the adoption of the most ambitious international treaty covering marine pollution ever adopted.

The Convention incorporated much of OILPOL 1954 and its amendments into Annex I, covering oil, while other annexes covered chemicals, harmful substances carried in packaged form, sewage and garbage.

Annex I expanded and improved on OILPOL in several ways. It specified requirements for continuous monitoring of oily water discharges and included the requirement for Governments to provide shore reception and treatment facilities at oil terminals and ports. It also established a number of Special Areas in which more stringent discharge standards were applicable, including the Mediterranean, Red Sea and Gulf, and Baltic Seas. These special areas would be implemented when the littoral States concerned had provided adequate reception facilities for dirty ballast and other oily residues.

An important regulation of Annex I was Regulation 13 which required segregated ballast tanks on new tankers over 70,000 deadweight tonnes. The aim was to ensure that ballast water (taken on board to maintain stability, such as when a tanker is sailing empty to pick up cargo) is never going to be contaminated by oil carried as cargo or fuel.

This regulation was initially opposed by States with large shipowning interests, but ultimately the fact that there was at the time sufficient tonnage to provide capacity for another decade led to the regulation being accepted.[9] However, a proposal strongly pushed by the United States for a requirement for double bottoms was not accepted.[10]

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[8] The amendment entered into force in 1978, but was incorporated into MARPOL 1973.

[9] Pollution, Politics and International law, Tankers at Sea. R. Michael M'Gonigle and Mark W. Zacher. University of California Press. 1979. p. 114.

[10] Double hulls were introduced in the 1992 amendments to MARPOL following the **Exxon Valdez** disaster.

Despite doubts expressed over States' willingness to ratify the Convention, one commentator noted: "The 1973 Conference - especially from an historical perspective - was a landmark in international environmental regulation. For the first time the installation is required of those ship and shore technologies necessary for the retention on board and proper port disposal of oil residues."[11]

As it turned out, there was slow progress at ratifying the Convention (partly due to technical problems in ratifying Annex II) and the non-ratification of MARPOL became a major concern.

At the same time, a series of tanker accidents in 1976-1977, mostly in or near United States waters and including the stranding of the **Argo Merchant**,[12] led to demands for more stringent action to curb accidental and operational oil pollution.

The United States took the lead in asking the IMO Council, in May 1977, to consider adopting further regulations on tanker safety. The Council agreed to convene a Conference in February 1978 - the Conference on Tanker Safety and Pollution Prevention.

A working group met in May, June and July, and a combined MSC/MEPC met in October, to prepare basic documents for the Conference.

1978 Conference on Tanker Safety and Pollution Prevention

The Conference, in February 1978, was attended by delegates from 61 States, observers from three States and representatives from 17 international organizations - a total of 451 people.

The Conference adopted a protocol to the 1973 MARPOL Convention, absorbing the parent Convention and expanding on the requirements for tankers to help make them less likely to pollute the marine environment.

The Protocol expanded the requirements for segregated ballast tanks to all new crude oil tankers of 20,000 dwt and above and all new product carriers of 30,000 dwt and above. The Protocol also required segregated ballast tanks to be protectively located, in other words, placed in areas of the ship where they will minimise the possibility of and amount of oil outflow from cargo tanks after a collision or grounding.

New tankers over 20,000 dwt were required to be fitted with crude oil washing system. Crude oil washing, or COW, is the cleaning or washing of cargo tanks with high pressure jets of crude oil. This reduces the quantity of oil remaining on board after discharge.

The Protocol also called for existing tankers over 40,000 dwt to be fitted with either segregated ballast tanks or crude oil washing systems; while for an interim period, it also allowed for some tankers to use clean ballast tanks, whereby specific cargo tanks are dedicated to carry ballast water only.

Additional measures for tanker safety were incorporated into the 1978 Protocol to the International Convention for the Safety of Life at Sea (SOLAS), 1974. These included the requirement for inert gas systems (whereby exhaust gases, which are low in oxygen and thus incombustible, are used to replace flammable gases in tanks) on all new tankers over 20,000 dwt and specified existing tankers. The SOLAS Protocol also included requirements for steering gear of tankers; stricter requirements for carrying of radar and collision avoidance aids; and stricter regimes for surveys and certification.

In order to speed up implementation of MARPOL, the Conference allowed that the Parties "shall not be bound by the provisions of Annex II of the Convention for a period of three years" from the date of entry into force of the Protocol, so that countries could accept Annex I and have three years to implement Annex II.

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[11] Pollution, Politics and International law, Tankers at Sea. R. Michael M'Gonigle and Mark W. Zacher. University of California Press. 1979. p. 120.

[12] The **Argo Merchant** ran aground off Massachussetts in December 1976. It was a small tanker, carrying 27,000 tons of oil, but caused huge public concern as the oil slick threatened New England resorts and Georges Bank fishing ground.

Both the 1978 MARPOL and SOLAS Protocols were seen as major steps in raising construction and equipment standards for tankers through more stringent regulations. Furthermore, a number of nations, such as the United States, made clear their commitment to pushing through the legislation to make the regulations mandatory and this was seen as a help in spurring on other maritime nations, keen to protect their shipowners' competitiveness, into ratifying the Convention.

If the world needed further reminder of the need for strict regimes to control oil pollution, it got it just one month after the 1978 Conference, when the **Amoco Cadiz** ran aground off Brittany, giving France its worst oil spill ever. The tanker, filled with 223,000 tons of crude oil, lost its entire cargo, covering more than 130 beaches in oil. In places, the oil was up to 30 cm thick.

Sufficient States had ratified MARPOL by October 1982, and the MARPOL 1973/78 Convention entered into force on 2 October 1983.

Estimate of oil entering the oceans in 1979

(Metric tonnes per anum)

Vessels	**1,500,000**
Accidental	**257,000**
Operational/deliberate	**1,243,000**
of which:	
Deballasting and tank washing - Load on Top	105,000
Deballasting and tank washing - non-Load on Top	529,000
Tank washing before maintenance	360,000
Bilge pumping	23,000
Bulk/oil carriers	46,000
Other ships	180,000
Off-shore operations	
Accidental	80,000
Operational/deliberate	insignificant
Other Sources	
Tanker terminal operations	70,000
Refinery effluents	300,000
Pipelines and handling spillage	40,000
Discarded lubricants	1,300,000
Total	**3,290,000**

Source: The Impact of Marine Pollution. Douglas J. Cuisine and John P. Grant. Croom Helm Ltd. London 1980.

The 1984 amendments

While MARPOL Annex I had entered into force, there was still work to be done in reviewing the Convention and ensuring it was being implemented.

The first amendments to MARPOL 73/78 were adopted in 1984, entering into force in 1986. They were designed to improve and strengthen existing provisions, such as Regulation 25 concerning subdivision and stability - intended to ensure that tankers can survive assumed damage. Certain provisions were waived, or relaxed, for example carriage of ballast water in cargo tanks was now permitted in certain circumstances, based on studies presented to the MEPC showing that this was appropriate.

In 1991, further amendments to Annex I, which entered into force in 1993, introduced a new chapter, requiring oil tankers and other ships[13] to carry a shipboard oil pollution emergency plan detailing the procedure to be followed in reporting an oil pollution incident, authorities to be contacted in the event of an oil pollution incident, a description of the action which must be taken and the procedures and point of contact on the ship for co-ordinating shipboard actions with national and local authorities.

But it was another tanker accident which led to one of the the most important changes to be made to the Convention since the adoption of the 1978 Protocol.

In March 1989, the **Exxon Valdez**, loaded with 1,264,155 barrels of crude oil, ran aground in the northeastern portion of Prince William Sound, spilling about one-fifth of its cargo. It was the largest crude spill, to date, in US waters and - probably the one which gained the biggest media coverage to date. The U.S. public demanded action - and duly got it.

The United States introduced its Oil Pollution Act of 1990 (OPA 90), making it mandatory for all tankers calling at U.S. ports to have double hulls.

The United States also came to IMO, calling for double hulls this time to be made a mandatory requirement of MARPOL. The implications of the **Exxon Valdez** spill were not lost on IMO Members, and the MEPC began discussions on how the U.S. proposals could be implemented.[14]

As on previous occasions[15], there was some resistance on the part of the oil industry to double hulls being made mandatory, due mainly to the cost of retrofitting existing tankers.

At the same time, several of IMO's Member States said that other designs should be accepted as equivalents and that measures for existing ships should also be contemplated. In 1991 a major study into the comparative performances of the double-hull and mid-height deck tanker designs was carried out by IMO, with funding from the oil and tanker industry.

It concluded in January 1992 that the two designs could be considered as equivalent, although each gives better or worse outflow performance under certain conditions.

Eventually, the MEPC agreed to make mandatory double hulls or alternative designs "provided that such methods ensure the same level of protection against pollution in the event of a collision or stranding". These design methods must be approved by the MEPC .

1992 amendments - prevention of oil pollution in the event of collision or stranding

The amendments introducing double hulls (or an alternative) were contained in Regulation 13F, adopted in March 1992 and entering into force in July 1993.

Regulation 13F applies to new tankers - defined as delivered on or after 6 July 1996 - while existing tankers must comply with the requirements of 13F not later than 30 years after their date of delivery.

Tankers of 5,000 dwt and above must be fitted with double bottoms and wing tanks extending the full depth of the ship's side. The regulation allows mid-deck height tankers with double-sided hulls, such as those developed by Japanese and European shipbuilders, as an alternative to double hull construction.

Oil tankers of 600 dwt and above but less than 5,000 dwt, must be fitted with double bottom tanks and the capacity of each cargo tank is limited to 700 cubic metres, unless they are fitted with double hulls.

The MEPC also adopted Regulation 13G, concerned with existing tankers, which makes provision for

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[13] Applies to oil tankers of 150 gross tons and above and ships other than tankers of 400 gt and above

[14] Another consequence of the **Exxon Valdez** disaster was the adoption in 1990 of an International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC), to provide a global framework for international co-operation in combating major incidents or threats of marine pollution.

[15] The United States had called for double hulls to be made mandatory at both the 1973 and 1978 Conferences

an enhanced programme of inspections to be implemented, particularly for tankers more than five years old.

Regulation 13G also allowed for future acceptance of other structural or operational arrangements - such as hydrostatic balance loading (HBL)[16] - as alternatives to the protective measures in the Regulation.

It was anticipated that many older tankers which could not be brought up to the new standard economically, would be scrapped and the MEPC adopted a resolution recommending that Member Governments take initiatives in co-operation with the shipbuilding and shipping industries, to develop scrapping facilities at a world-wide level, to promote research and development programmes and to provide technical assistance to developing countries in developing ship scrapping facilities.

The MEPC also adopted amendments to MARPOL drastically reducing the amount of oil which can be discharged into the sea as a result of routine operations, by forbidding non-tankers to discharge oily wastes if the oil content exceeds 15 parts per million (an amount which is virtually undetectable), and permitting tankers to discharge oily mixtures only at a rate of 30 litres per nautical mile (and only outside special areas).

The 1994 amendments - implementation

In November 1994, the MEPC adopted amendments to MARPOL aimed at improving implementation of the Convention, by making it possible for ships to be inspected when in the ports of other Parties to the Convention, to ensure that crews are able to carry out essential shipboard procedures relating to marine pollution prevention.

The amendments, which entered into force on 3 March 1996, also applied to Annex II, which is concerned with pollution by noxious liquid substances (such as chemicals); Annex III, containing regulations for the prevention of pollution by harmful substances in packaged form; and Annex V, which deals with garbage.

Similar amendments were made to the International Convention for the Safety of Life at Sea (SOLAS), 1974 in May 1995. A number of IMO Conventions contain provisions for port State control inspections but previously these have been limited primarily to certification and the physical condition of the ship and its equipment.

Extending port State control to operational requirements was seen as an important way of improving the efficiency with which international safety and anti-pollution treaties are implemented.

The 1997 Amendments - intact stability and special areas

In September 1997, the MEPC adopted a new Regulation 25A to Annex 1, specifying intact stability criteria for double hull tankers. The amendments, which enter into force on 1 February 1999, were deemed necessary after experience had shown that a small number of double hull tankers were being constructed without enough bulkheads to maintain stability. The regulation, which is technical in nature, defines the criteria for achieving intact stability for double hull tankers.

Another amendment makes the North West European waters a "special area", thereby prohibiting discharge into the sea of oil or oily mixture from any oil tanker and ship over 400 gt in the North Sea and its approaches, the Irish Sea and its approaches, the Celtic Sea, the English Channel and its approaches and part of the North East Atlantic immediately to the West of Ireland, from the time when littoral States have made provision for adequate reception facilities.

The countries concerned, informed the MEPC in April 1998, that reception facilities were adequate and that the North West European Waters special area should take effect as from 1 August 1999.

MARPOL Annex I - achievements

In 1990, the National Research Council Marine Board of the United States credited MARPOL 73/78 with making "a substantial positive impact in decreasing the amount of oil that enters the sea".

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[16] Hydrostatic balance loading (HBL) is based on the principle that if a hull is breached, the pressure from outside would be greater than that from the oil inside so seawater would flow in, pushing the oil upwards through non-return valves into ballast tanks; rather than an outflow of oil into the sea.

A study carried out by the Board showed that in 1981, some 1,470,000 tons of oil entered the world's oceans as a result of shipping operations. Most of it came from routine operations, such as discharges of machinery wastes and tank washings from oil tankers (the latter alone contributed 700,000 tons). Accidental pollution contributed less than 30% of the total. [17]

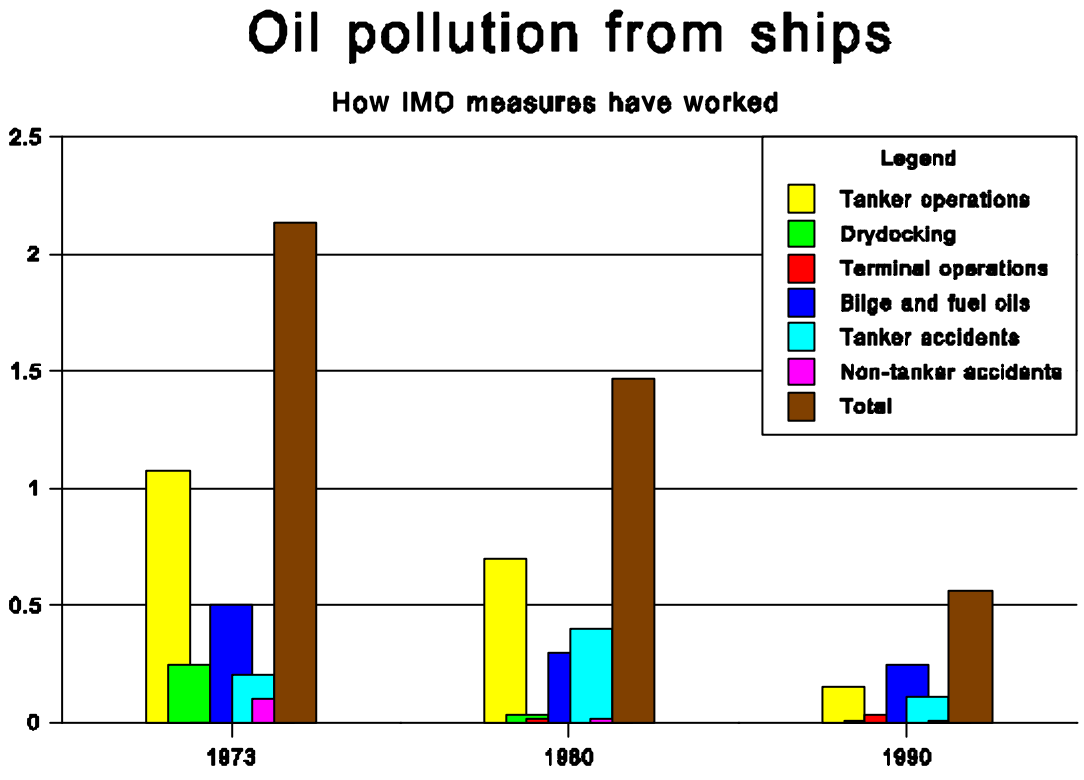
By 1989, it was estimated that oil pollution from ships had been reduced to 568,800 tons. Tanker operations contributed only 158,000 tons of this.

Moreover, although the 1978 Protocol did not enter into force until 1983, many of its requirements were already being implemented. The "load on top" system, for example, had been implemented since 1978 and was installed on many tankers because it reduced the amount of oil wasted during routine operations (and thereby increased profits). The "new ship" and "new tanker" definitions included in the original 1973 Convention and the 1978 Protocol also meant that all tankers built after those dates already complied with MARPOL 73/78 requirements.

Today, tankers transport some 1,800 million tonnes of crude oil around the world by sea including 50 percent of U.S. oil imports (crude oil and refined products). Most of the time, oil is transported quietly and safely.

MARPOL measures introduced after major accidents have contributed to the fact that today a tanker is more likely to be a well constructed, well operated ship.

The fact that MARPOL measures have essentially been disaster-led is not necessarily a bad thing. The impact of the public outcry over oil slicks or tar balls on beaches has been to ensure that the oil majors who transport crude oil around the world are willing to invest in safety and pollution prevention features - because an accident, apart from its costs in human life or physical terms - could cost them dearly in bad publicity.



[17] See Focus on IMO - MARPOL

Annex I issues

Annex I of MARPOL is generally considered "complete". Nonetheless, IMO Member States continue to approach IMO where they feel there is room for improvement. For example, there is currently a debate on whether to speed up the phase-in period for double hulls on existing tankers for certain sizes of oil and product carriers.

But there is still concern over the fact that a number of important oil producing and exporting nations have so far failed to ratify MARPOL.

One reason may be that these countries would be obliged to provide reception facilities for oily wastes. The costs of doing so could be great, since most tank cleaning operations take place during the ballast stage of the tanker's voyage: the reception facilities required at an oil loading port, therefore, are much greater than those needed elsewhere.

All of this makes life very difficult for tanker owners and crew. MARPOL greatly limits the discharge of wastes into the sea and in some areas bans it completely: but if the ports fail to provide the reception facilities the captain of the ship has to dispose of the wastes in some other way. The temptation is to do this illegally - and hope that no one finds out.

IMO is addressing the problem of inadequate reception facilities and the MEPC is currently looking at the best mechanisms for financing port reception facilities. It is also involved in a number of technical co-operation projects to help developing countries implement MARPOL requirements.

Review of Annex I

With the aim of facilitating more effective implementation of Annex I, the MEPC agreed to review all the provisions of the Annex, and a General Action Plan for the Revision of Annexes I and II was prepared at MEPC 37 in 1995. The revision aims at simplifications of present requirements, adaption to technical progress and identification of inconsistencies with Annex II, including editorial amendments. It is expected that the revision work will be completed by 2002.

Annex II - Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk

Background

The transportation by sea of liquid chemicals in bulk developed in line with the increasing number of by-products being produced by the petroleum refineries.

Chemical tankers have developed alongside the growth in the chemicals industry since World War II. At first, oil tankers were adapted to carry liquid chemicals, by installing special tanks, double bottoms and structural and piping arrangements.

But as the range of products from the chemicals trade increased, so chemical tankers became more complex. In the early 1960s, the first purpose-built chemical tankers made their appearance - designed to offer maximum protection to the cargo and to the crew, because of the nature of the chemicals involved. Chemical tankers are generally smaller in size than oil tankers, ranging from 500 gross tonnage to 40,000 gross tonnage, and are often of extremely complex construction, being designed to carry many different substances at the same time, each with different properties and requiring different handling.

The main chemicals carried in bulk include heavy chemicals; molasses and alcohols; vegetable oils and animal fats; petrochemical products; and coal tar products (see page 17).

Chemical tanker safety

The issue of chemical tanker safety was first raised in the IMO forum in the mid-1960s and resulted in the formation of a new Sub-Committee on Ship Design and Equipment, which was asked to "consider as its initial task the construction and equipment of ships carrying chemicals in bulk". [18]

The new sub-committee held its first session in January 1968 and agreed to prepare a code to cover the design criteria, construction and equipment of chemical tankers. As an initial measure, however, it drew up an interim recommendation for existing chemical tankers which was issued as an MSC circular in 1970.

In October 1971, the IMO Assembly adopted the Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (BCH Code)[19], which set out agreed international standards for the carriage and equipment requirements for such cargoes. The Code applied to ships built on or after 12 April 1972, although it was at the time only recommendatory in nature. However, several countries with a significant number of chemical tankers in their fleet went on to implement the Code into their national legislation.

The Code set out requirements on ship capability for surviving damage and cargo tank location, according to the type of products carried: type I ships would be designed to carry products requiring maximum preventive measures to preclude escape of cargo; type II for products requiring significant preventive measures; and type III covered products requiring a moderate degree of containment. The code gave a list of more than 100 chemicals with the appropriate recommended ship type - based on the evaluation of those chemicals according to a list of specified hazards, including flashpoint, of the chemical and health hazards.

The Code did not tackle the pollution aspects of the transportation of chemicals in bulk: IMO's Sub-Committee on Marine Pollution[20] was already beginning to prepare regulations on the control of discharges from chemical tankers, to be incorporated into the planned new convention on marine pollution.

1973 MARPOL Convention

While the BCH Code addressed the construction and design of chemical tankers to ensure safe carriage of these substances, Annex II of the 1973 MARPOL Convention was concerned with preventing or minimising the operational discharge and accidental release of these substances into the sea.

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[18] MSC 15 March 1967; see Focus chemicals at Sea 1986

[19] Assembly Resolution A.212(VII)

[20] The sub-committee became the Marine Environment Protection Committee in 1973

The regulations were the first to address operational discharges of chemicals from operations such as tank washing. However, the regulations required Governments to ensure reception facilities would be available to receive chemical residues - and this was seen as a sticking point even as States at the 1973 Conference adopted the Convention.

Commenting on the Annex II regulations in 1974, the Oil Companies International Marine Forum (OCIMF) said:

"The provisions of Annex II for control of noxious liquid substances in bulk represent an entirely new set of requirements for previously uncontrolled discharges which may well cause Governments concern as to their ability to comply with its requirements. However, the essential shipboard requirements are operational in character and were developed largely by specialists in the operation of chemical tankers. Therefore it is believed that the procedures needed to assure a high degree of compliance may be evolved in a relatively expeditious fashion.

Perhaps the most difficult aspect of compliance will be concerned with the collection and eventual disposal of residues from reception facilities which must be created for this purpose. As contrasted with the reception facilities required for tankers and other ship residues, the facilities required in the chemicals trade may initially be relatively small in number and volume but they represent a much more difficult technical problem."[21]

While Annex I was based on the premise that all oils are harmful substances and should be prevented from entering the sea, Annex II recognized the wide diversity in physical and biological properties of the substances it covered. As a result, the substances were divided into four categories graded A to D, according to the hazard they present to marine resources, human health or amenities.

(a) **Category A** - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a major hazard to either marine resources or human health or cause serious harm to amenities or other legitimate uses of the sea and therefore justify the application of stringent anti-pollution measures. Examples are acetone cyanohydrin, carbon disulphide, cresols, naphthalene and tetraethyl lead.

(b) **Category B** - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a hazard to either marine resources or human health or cause harm to amenities or other legitimate uses of the sea and therefore justify the application of special anti-pollution measures. Examples are acrylonitrile, carbon tetrachloride, ethylene dichloride and phenol.

(c) **Category C** - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a minor hazard to either marine resources or human health or cause minor harm to amenities or other legitimate uses of the sea and therefore require special operational conditions. Examples are benzene, styrene, toluene and xylene.

(d) **Category D** - Noxious liquid substances which if discharged into the sea from tank cleaning or deballasting operations would present a recognizable hazard to either marine resources or human health or cause minimal harm to amenities or other legitimate uses of the sea and therefore require some attention in operational conditions. Examples are acetone, phosphoric acid and tallow.

The Annex also listed "other liquid substances" deemed to fall outside Categories A, B, C or D and therefore representing no harm when discharged into the sea from tank cleaning or ballasting operations. These substances included coconut oil, ethyl alcohol, molasses, olive oil and wine.

A list of some 250 noxious liquid substances, with categorization, was given in Appendix II to the Annex.

The way in which these substances can be discharged varies according to the hazard they present.

[21] MEPC II/Inf.10 page 12

Category A substances can only be discharged into reception facilities - not even residues resulting from tank cleaning can be discharged into the sea. This is permitted for other categories, but only under strict controls: Category B substances, for example, can never be discharged in quantities greater than one cubic metre. No discharge of residues containing noxious substances is permitted within 12 miles of the nearest land in a depth of water of less than 25 metres. Even stricter restrictions apply in the Baltic Sea and Black Sea. Parties to the Convention were obliged to issue detailed requirements for the design, construction and operation of chemical tankers which contain at least all the provisions of the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (The 1985 amendments made the Code mandatory - see below.)

Operations involving substances to which Annex II applies must be recorded in a Cargo Record Book, which can be inspected by the authorities of any Party to the Convention.

The 1978 Conference

As some observers had predicted, the requirements in Annex II were making it difficult for some Governments to ratify the Convention. As a result, the 1978 Conference on Tanker Safety and Pollution Prevention agreed that Annex II would become effective three years after Annex I entered into force. This encouraged Governments to ratify the Convention, which entered into force on 2 October 1983 - giving parties to the Convention until 2 October 1986 to implement the regulations.

However, it soon became clear that Annex II was not only outdated in some respects but also still presented considerable difficulties as far as implementation was concerned.

A major problem with the implementation of Annex II arose from the original premise on which it was drafted, namely that the quantity of Category B or C chemicals remaining in a tank after unloading could be calculated using vertical and horizontal surface areas and the relevant physical properties of the substance at the temperature concerned, e.g. specific gravity and viscosity.

Providing this calculated quantity was less than the upper limit established by the Convention this residue could be discharged into the wake of the ship with the proviso that the resultant concentrations in the sea did not exceed a certain limit. The application of the latter criteria required further calculations to establish a suitable speed and the under-water discharge rate for the chemical concerned.

But this meant that the operation of a chemical carrier with parcels of different chemicals and considerable variability of physical properties and ambient temperature conditions would mean that a member of the ship's crew would be employed virtually full-time in computing residue quantities and ascertaining discharge parameters.

Experience indicated that this complicated procedure described above could be circumvented if the efficient stripping of tanks to a relatively insignificant residue level during unloading was made mandatory. Those smaller quantities of residues could then be discharged overboard without limitation or rate of discharge, etc.

Another major problem of Annex II concerned reception facilities, the provision of which was crucial to the effective implementation of the regulations. Reception facilities for chemicals are more expensive and complicated than those designed for the reception of oily wastes, since the wastes they are required to deal with are much more varied. There is also little opportunity for recycling them (as can be done with some oily wastes). As a result, governments and port authorities were reluctant to provide such facilities, particularly as the Convention itself was ambiguous as to whether the facilities should be provided in loading or unloading ports.

Some other aspects of implementation were also of concern, such as developing monitoring equipment to ensure that chemicals are properly diluted before being discharged into the sea. Therefore certain operational procedures had to be developed to limit the discharge rate to minimize harm to the environment.

In October 1982, the last ratification required for entry into force of the 1978 MARPOL Protocol was deposited with the IMO Secretary-General, and the Convention entered into force on 2 October 1983. This meant that Annex II would become binding for Parties three years later, on 2 October 1986 and made it even more imperative that something be done quickly to ensure that the Annex could actually be implemented.

In 1983, the IMO Assembly had adopted procedures and arrangements for the discharge of noxious liquid substances which are called for by various regulations of Annex II and these were applied on a trial basis by a number of IMO Member States. These trials showed a number of difficulties in implementing Annex II, mainly associated with the problems already outlined in the previous paragraphs. They included:

1. The requirements were too complex and put a heavy burden on the crew of the ship.

2. Measures of control were very limited and compliance with the standards depended entirely upon the willingness of the crew.
3. There was a general lack of facilities for the reception of chemical wastes. Although provision of facilities themselves did not present great difficulties because the amount is small compared with oily wastes, treatment of wastes and ultimate disposal was a problem.

IMO consequently, prepared a number of important changes to Annex II which were formally adopted at an "expanded" meeting of IMO's Marine Environment Protection Committee in December 1985.

The 1985 amendments

The 1985 amendments were designed to encourage shipowners to improve cargo tank stripping efficiencies, and included a number of specific requirements to ensure that both new and existing chemical tankers reduce the amount of residues to be disposed of.

At the same time, the amendments made it possible to adopt simplified procedures for the discharge of residues.

The amendments were also aimed at reducing the quantities of B and C substances that were discharged into the sea by introducing a new regulation 5A on *Pumping, piping and unloading arrangements*, which called for new ships (built after 1 July 1986) to be provided with pumping and piping arrangements such that the residue left after emptying a tank would be cut to a specified minimum. Ships constructed before 1 July 1986 also had to ensure pumping and piping arrangements restricted the amount of residue to specified limits.

As a result, the 1985 amendments were designed to bring about a significant reduction in the generation of wastes resulting from shipboard operations, thereby reducing marine pollution by noxious liquid substances from ships as well as cutting drastically the environmental problems ashore involved with the treatment and ultimate disposal of wastes received from ships. In addition, the amendments provided for improved possibilities for executing effective port State control, thus ensuring full compliance with the provisions of the Annex.

It was also decided in 1985, that the implementation date of existing Annex II (originally set as three years after entry into force of MARPOL 73/78 as a whole) should also be deferred until 6 April 1987, the date of entry into force of the 1985 amendments. If this had not been done, the Annex would have entered into force in October 1986 only to be changed in crucial aspects, including the Certificate and Cargo Record Book, barely six months later. This would have imposed a considerable burden on Administrations and the shipping community.

Another important feature of the 1985 amendments to Annex II was to make mandatory the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code). This Code was developed to improve and update the existing Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (BCH Code) and had been made mandatory under the International Convention for the Safety of Life at Sea (SOLAS) through amendments to that Convention adopted in 1983.

The IBC Code applies to chemical tankers constructed on or after 1 July 1986[22], while chemical

[22] This was the date of entry into force of part B of chapter VII of SOLAS 1974 contained in the 1983 amendments to the 1974 SOLAS Convention.

tankers constructed before that date had to comply with the requirements of the existing BCH Code.[23]

The 1985 MARPOL amendments also brought survey and certification requirements into line with Annex I (regulations 10-12); introduced a scheme for the mandatory pre-washing of cargo tanks (regulation 8); added a new regulation dealing with oil-like noxious liquid substances (regulation 14); revised the list of noxious and other substances appended to the Annex; and updated the form of the Cargo Record Book (regulation 9).

Annex II implementation

Annex II of MARPOL (with the 1985 amendments) became binding for Parties on 6 April 1987.

The Annex contained the following provisions for controls on discharges:

Pollution Category	**Maximum discharge quantity allowed from any one tank** **Existing ships**	**New ships**
A	None	None
B	300 litres	100 litres
C	900 litres	300 litres
D	Unrestricted (but discharge allowed only under certain conditions, including not less than 12 nautical miles from nearest land)	Unrestricted (but discharge allowed only under certain conditions, including not less than 12 nautical miles from nearest land)
Other	Unrestricted	Unrestricted

Categorization of products for Annex II

[23] The purposes of each of these Codes is to provide an international standard for the safe transport by sea in bulk of liquid dangerous chemicals, by prescribing the design and construction standards of ships regardless of tonnage involved in such transport and the equipment they should carry so as to minimize the risks to the ship, its crew and to the environment, having regard to the nature of the products carried.

The categorization of noxious liquid substances for Annex II was based on evaluations carried out by a special Working Group on the Evaluation of Harmful substances (EHS), set up by the joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP)[24].

The EHS Working Group has evaluated substances according to a range of properties, including bioaccumulaiton, tainting, acute aquatic toxicity, human health effects and potential damage to living resources. This evaluation procedure results in a GESAMP Hazard Profile for individual substances - which is used as a basis for defining pollution categories (and ship types) for substances transported under Annex II.

A revised list of chemicals in Annex II and in the International Bulk Chemical Code and the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk were adopted in the March 1989 amendments to MARPOL, which entered into force on 13 October 1990.

Review of Annex II

In 1992, the MEPC agreed to review all the provisions in Annex II, with the aim of simplifying the requirements to encourage more widespread implementation of the Annex. At the same time, it agreed to review the categorization system.

The decision to completely review the Annex was influenced by a number of developments.

Firstly, improvements in ship technology meant that stripping of tanks had improved to the extent that only very minimum amounts of residues would be left in tanks after unloading and consequently the limits on the discharges of substances could also be drastically cut.

As improvements in technology have enabled IMO to reconsider the amount of discharge permitted to enter the marine environment, they have also provided an opportunity to reconsider the number of defined pollution categories.

Another issue was increased understanding of the environmental impact of chemicals on the marine environment. In the existing product categorization, Annex II placed considerable emphasis on acute aquatic toxicity, tainting of fish and bioaccumulation with associated harmful effects, but it was being recognized that other properties were equally important - such as chronic aquatic toxicity, and the effect on wildlife or seabed of substances that would sink or persistently float on the surface.

The 1992 UNCED Rio Conference is also influencing the review of Annex II. Chapter 19 of Agenda 21 adopted by the Conference included a programme on harmonization of classification and labelling of chemicals and the United Nations Committee of Exerts on the transport of Dangerous Goods and the Organization for Economic Cooperation and Development (OECD) have been acting as clearing houses for the development of harmonized hazard classification systems covering the physical and biological properties that affect safety and protection of the environment.

The work of these organizations in developing harmonized classification systems has a bearing on the work of the GESAMP Evaluation of Hazardous Substance working Group - and on the work of the Working Group on the Evaluation of Safety and Pollution Hazards (ESPH) - a working group of the IMO Sub-Committee on Bulk Liquids and Gases (BLG), which reports to the MEPC and MSC. The ESPH working group is dealing primarily with the assignment of pollution categories and carriage requirements for products in order to ensure their safe carriage and protection of the marine environment.

Revision of categories towards three-category system

As instructed by the MEPC, the ESPH working group is considering whether the existing five product category system in Annex II (categories A, B, C, D plus "other liquid substances") could be simplified into a three-category system.

The MEPC at its 40th session in 1997, agreed that it was inappropriate to make any decisions related to re-categorization until it had all the facts before it, including environmental, economic, practical and administrative considerations. As a result, the MEPC agreed to continue with the work in developing alternative categorization systems along with all the resultant pros and cons of introducing such systems

[24] GESAMP includes experts from various United Nations agencies, including IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP

The three-category system is based on the premise - in line with the development of the so-called precautionary approach[25] - that no product should be permitted to enter the sea in unlimited quantities, as is the case with Category D and "other liquid substances" under Annex II. Therefore these two categories could be combined, creating a category for substances with limited restrictions.

A second category could combine current categories B and C, since ship technology now makes it easier for all ships to achieve minimum residue levels of 100 litres per tank - so there is no need to differentiate.

The third category would be equivalent to the existing Category A - in other words, substances considered highly environmentally hazardous and which should not be discharged at all.

The ESPH working group is continuing work on refining alternative systems including the three-category system.

It is envisaged that the complete revision of Annex II will be completed by 2002. By then, hazard profiles for all noxious liquid substances carried in bulk on ships which come under MARPOL Annex II will have been re-evaluated and re-categorized. This is a mammoth task - some 300 substances are listed in the International Bulk Chemical Code.

The MEPC is also looking into the whole issue of reception facilities and how to ensure adequate reception facilities are provided at ports.

[25] The precautionary approach was introduced into the 1996 protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (LC), and is based on the premise that unless a substance can be proved to be harmless, it should not be dumped in the sea. Previously, the onus has been to prove something is harmful, to get its dumping banned.

Noxious liquid substances carried in bulk - examples[26]	
Heavy chemicals	Those substances produced in large quantities, for example: **sulphuric acid** - among the cheapest of all acids and can be produced from sulphur, air and water. It is also very versatile, being used for the production of phosphate fertilizer, explosives such as TNT, plastics such as rayon, purifying petroleum and removing oxides from metals and in storage batteries; **phosphoric acid** - used for the production of superphosphates and various other products, including detergents, paints, and foodstuffs: **nitric acid** - a basic ingredient of explosives, nitrate fertilizers and many dyes, and plastics; **caustic soda** is also shipped in solution; **hydrochloric acid** - used in steel reduction process and ore reduction; **ammonia**.
Molasses and alcohols	**Molasses** comes from either sugar beet or sugar cane and can be fermented into alcohols such as rum. Many **alcohols** are produced by the petrochemical industry, but some can also come from the fermentation of starch, such as ethanol. Alcohols of this type, including ethyl, methyl and propyl, are used in industrial. processes (for examples to make cellulose acetate, which is a thermoplastic moulding compound used in the manufacture of telephones, buttons, films and many other products). **Wines and some beers** also come into this category and are being increasingly carried at sea in bulk quantities on ships which are in fact specialized chemical tankers.
Vegetable and animal fats and oils	**Edible vegetable oils** are derived from soya beans, groundnuts, cottonseed, sunflowers, olives, rape and other seeds. **Coconut and palm oil** can be used for cooking and also in the production of soap. **Industrial oils** come from linseed and castor seed. Some fats are extracted from animals including lard and fish oils.
Petrochemical products	The most complex and probably the most versatile group of chemicals carried in bulk - all are carbon compounds basically derived from oil or gas. They are extensively used in the production of fibre, artificial rubber and plastics and many are carried on liquefied gas carriers. Substances carried in chemical tankers include aromatics, such as benzene, which nowadays are derived mainly from oil but can be produced from coal. Other important petrochemicals include xylenes (used in the production of polyester fibres); phenol (previously known as carbolic acid) and styrenes.
Coal tar products	Coal tar is derived from the carbonization of coal. It can be converted into numerous products, many of which can also be produced from oil (oil and coal are both fossil fuels composed of hydrocarbons). Coal tar derivatives include benzene, phenol (used for the production of Bakelite, the first 'plastic'), naphthalene and many more. Common products which are derived from coal include nylon, aspirin, antiseptics and herbicides.

[26] Each individual product is evaluated according to the hazards it presents.

Annex III - Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form

The objective behind the regulations contained in Annex III of MARPOL was to identify marine pollutants so that they could be packed and stowed on board ship in such a way as to minimise accidental pollution as well as to aid recovery by using clear marks to distinguish them from other (less harmful) cargoes.

The rules on discharging harmful goods was straightforward: "Jettisoning of harmful substances carried in packaged form shall be prohibited, except where necessary for the purpose of securing the safety of the ship or saving life at sea". [27]

The Annex also called for "appropriate measures based on the physical, chemical and biological properties of harmful substances shall be taken to regulate the washing of leakages overboard, provided that compliance with such measures would not impair the safety of the ship and persons on board."[28]

The Annex applies to all ships carrying harmful substances in packaged form, or in freight containers, portable tanks or road and rail tank wagons. The regulations require the issuing of detailed standards on packaging, marking, labelling, documentation, stowage, quantity limitations, exceptions and notifications, for preventing or minimizing pollution by harmful substances.

However, implementation of the Annex was initially hampered by the lack of a clear definition of harmful substances carried in packaged form. This was remedied by amendments to the International Maritime Dangerous Goods Code (IMDG Code) to include marine pollutants.

The IMDG Code was first adopted by IMO in 1965 and lists hundreds of specific dangerous goods together with detailed advice on storage, packaging and transportation. The amendments extending the Code to cover marine pollutants, which entered into force in 1991, added the identifier "marine pollutant" to all substances classed as such. All packages containing marine pollutants must be marked with a standard marine pollutant mark.

Annex III of MARPOL was also amended at the same time, to make it clear that " 'harmful substances' are those substances which are identified as marine pollutants in the International Maritime Dangerous Goods Code (IMDG Code)."

Annex III was optional under the terms of the 1973 Convention which meant that States who had signed up to MARPOL 73/78 were not required to adopt the Annex at the same time. The optional Annexes (Annexes IV and V were also optional) would enter into force 12 months after not less than 15 States with combined merchant shipping tonnage of more than 50 percent of the world fleet had ratified them.

Annex III received sufficient ratifications by 1991 and entered into force on 1 July 1992. It has been ratified by 87 States, representing 79.13 percent of world merchant shipping (at 1 October 1998).

Annex III today

The main changes affecting Annex III today relate to the IMDG Code, rather than to any developments in the Annex itself.

The MSC in May 1998 adopted Amendment 29 to the IMDG Code, which is aimed at bringing the Code into line with the tenth revised edition of the United Nations Recommendations on the Transport of Dangerous Goods, set to come into force on 1 January 1999, with a transitional period to 1 July 1999.

Amendment 29 also includes a revised classification of marine pollutants, based on the work carried out by GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection) on hazard profiles.

Meanwhile, the IMDG Code is being reformatted to make it more user-friendly and easily understandable. The present Code appears in four volumes, but the reformatted Code will appear in two volumes: one covering the general introduction, with information about the nine classes of dangerous goods, packaging and portable tanks; the second incorporating the list of substances plus index.

The final draft of the reformatted Code is expected to be adopted during 1999 with entry into force

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[27] MARPOL Annex III, Regulation 7 (1)

[28] MARPOL Annex III, Regulation 7 (2)

scheduled for 1 January 2001.

Annex IV - Prevention of Pollution by Sewage from Ships

The discharge of raw sewage into the sea can create a health hazard, while in coastal areas, sewage can also lead to oxygen depletion and an obvious visual pollution - a major problem for countries with large tourist industries.

The main sources of human-produced sewage are land-based - such as municipal sewers or treatment plants.

It is generally considered that on the high seas, the oceans are capable of assimilating and dealing with raw sewage through natural bacterial action and therefore the regulations in Annex IV of MARPOL prohibit ships from discharging sewage within four miles of the nearest land, unless they have in operation an approved treatment plant. Between 4 and 12 miles from land, sewage must be comminuted and disinfected before discharge.

Governments are required to ensure the provision of adequate reception facilities at ports and terminals for the reception of sewage.

The Annex, which is optional, will enter into force after being accepted by 15 states where merchant fleets represent 50 percent of world tonnage. By October 1998 it had been accepted by 71 countries with 42.50 percent of world tonnage.

The Annex, when it comes into force, will apply to new ships (built after the date of entry into force of the Annex) of 200 gross tonnage and above or carrying more than 10 persons. It will apply to existing ships (built before the date of entry into force of the Annex) 10 years after date of entry into force.

Annex IV today

Although the Annex has not come into force, many countries have imposed regulations which are in line with its requirements, on ships visiting their coastlines to avoid the damage to health and amenities from the discharge of sewage. In practice, evidence suggests that all cruise ships and large passenger ships already have sewage treatment plants on board, so that ships are not seen as a major source of sewage pollution.

Meanwhile, an IMO Correspondence Group is working on reviewing the regulations in Annex IV with a view to updating and revising them where necessary, to encourage further ratifications.

The obligation for Parties to provide reception facilities is seen as one issue hampering ratification, which could be resolved by requiring all or most ships to have sewage treatment plants. Another issue being considered is the size of ships to which the regulations should apply: one proposal is that they should apply to larger passenger ships only.

The Correspondence Group is also working on harmonizing IMO standards on sewage treatment plants with those being developed by the International Standards Organization (ISO).

Annex V - Prevention of Pollution by Garbage from Ships

Garbage from ships can be just as deadly to marine life as oil or chemicals. The greatest danger comes from plastic, which can float for years. Fish and marine mammals can in some cases mistake plastics for food and they can also become trapped in plastic ropes, nets, bags and other items - even such innocuous items as the plastic rings used to hold cans of beer and drinks together.

It is clear that a good deal of the garbage washed up on beaches comes from people on shore - holiday-makers who leave their rubbish on the beach, fishermen who simply throw unwanted refuse over the side - or from towns and cities that dump rubbish into rivers or the sea. But in some areas most of the rubbish found comes from passing ships which find it convenient to throw rubbish overboard rather than dispose of it in ports. One estimate in the early 1980s suggested that more than six million cans and 400,000 bottles were being dumped into the sea from ships every day.[29]

For a long while, many people believed that the oceans could absorb anything that was thrown into them, but this attitude has changed along with greater awarenes of the environment. Many items can be degraded by the seas - but this process can take months or years, as the following table shows:

Time taken for objects to dissolve at sea	
Paper bus ticket	2-4 weeks
Cotton cloth	1-5 months
Rope	3-14 months
Woollen cloth	1 year
Painted wood	13 years
Tin can	100 years
Aluminium can	200-500 years
Plastic bottle	450 years

Source: Hellenic Marine Environemnt Protection Association (HELMEPA)

The 1973 MARPOL Convention sought to eliminate and reduce the amount of garbage being dumped into the sea from ships. Under Annex V of the Convention, garbage includes all kinds of food, domestic and operational waste, excluding fresh fish, generated during the normal operation of the vessel and liable to be disposed of continuously or periodically.

Annex V totally prohibits of the disposal of plastics anywhere into the sea, and severely restricts discharges of other garbage from ships into coastal waters and "Special Areas". The Annex also obliges Governments to ensure the provision of facilities at ports and terminals for the reception of garbage.

The special areas established under the Annex are the Mediterranean Sea, the Baltic Sea Area, the Black Sea area, the Red Sea Area, the Gulfs area, the North Sea, the Wider Caribbean Region and the Antarctic Area - areas which have particular problems because of heavy maritime traffic or low water exchange caused by the land-locked nature of the sea concerned.

Although the Annex was optional, the Annex did receive sufficient number of ratifications to enter into force on 31 December 1988.

Provisions to extend port State control to cover operational requirements as regards prevention of marine pollution were adopted as a new regulation 8 to the Annex in 1994 (entering into force on 3 March 1996). Like similar amendments adopted to the other MARPOL Annexes, the regulation makes it clear that port State control officers can inspect a foreign-flagged vessel "where there are clear grounds for believing that the master or crew are not familiar with essential shipboard procedures relating to the prevention of

[29] Lloyd's List 24/12/82

pollution by garbage".

Implementation, and enforcement, was also the focus of a further new Regulation 9, adopted in 1995, which requires all ships of 400 gross tonnage and above and every ship certified to carry 15 persons or more, and every fixed or floating platform engaged in exploration and exploitation of the seabed, must provide a Garbage Record Book, to record all disposal and incineration operations. The date, time, position of ship, description of the garbage and the estimated amount incinerated or discharged must be logged and signed. The books must be kept for a period of two years after the date of the last entry.

This regulation does not in itself impose stricter requirements - but it makes it easier to check that the regulations on garbage are being adhered to as it means ship personnel must keep track of the garbage and what happens to it. It may also prove an advantage to a ship when local officials are checking the origin of dumped garbage - if ship personnel can adequately account for all their garbage, they are unlikely to be wrongly penalised for dumping garbage when they have not done so.

Regulation 9 came into force for new ships from 1 July 1997 but from 1 July 1998 all applicable ships built before 1 July 1997 also have to comply: all ships of 400 gross tonnage and above and every ship certified to carry 15 persons or more, and every fixed or floating platform engaged in exploration and exploitation of the seabed.

The Regulation also requires every ship of 12 metres or more in length to display placards notifying passengers and crew of the disposal requirements of the regulation; the placards should be in the official language of the ship's flag State and also in English or French for ships travelling to other States' ports or offshore terminals.

Despite the entry into force of Annex V in 1988, even recent surveys carried out in the United States each year have produced up to 10 tons of garbage per mile of coastline, a record that can probably be matched in may other parts of the world. Plastic forms the biggest single item found.

Persuading people not to use the oceans as a rubbish tip is a matter of education - the old idea that the sea can cope with anything still prevails to some extent but it also involves much more vigorous enforcement of regulations such as Annex V.

Wider Caribbean project

In 1993, IMO, in co-operation with the World Bank, began a major project to solve the garbage disposal problems in the Caribbean - called the Wider Caribbean Initiative on Ship-generated Waste (WCISW) Project.

The Wider Caribbean region was chosen a a focus for this project as it is a magnet for the increasingly popular cruise shipping industry. Cruise liner passengers like to visit a different port each day and a cruise ship with 3,000 people or more on board generates as much garbage as a small town: figures show that each person on a passenger vessel generates more than 2.5 kilograms of garbage per day. On a ship carrying 3,000 passengers and crew, that means more than seven tonnes of garbage per day.

In theory, the ship should be able to dispose of this when it reaches port - but in practice the island States of the Caribbean do not have the resources to cope with such a deluge. When the project started in 1993, many of them had not ratified Annex V of MARPOL because they were unwilling to provide reception facilities for cruise ships' rubbish when the cruise ships themselves do not make a great contribution to local tourism income.

Yet, if ships cannot dispose of their rubbish in ports the danger is that some of them will be tempted to do so - illegally - at sea. And this could lead to immense damage being caused to the pristine environment that attracts tourists to the Caribbean in the first place.

The result of the project was that six more countries ratified MARPOL and it is anticipated that all 29 countries in the area will have done so by 2001. The next stage will be ensuring the infrastructure is actually in place (i.e. reception facilities) to meet the "special area" status of the region.

Annex VI - Prevention of Air Pollution from Ships

Background

The issue of controlling air pollution form ships - in particular, noxious gases from ships' exhausts - was discussed in the lead up to the adoption of the 1973 MARPOL Convention. However, it was decided not to include air pollution at the time.

Meanwhile, air pollution was being discussed in other arenas. The 1972 United Nations Conference on the Human Environment in Stockholm marked the start of active international cooperation in combating acidification, or acid rain. Between 1972 and 1977, several studies confirmed the hypothesis that air pollutants could travel several thousand kilometres before deposition and damage occurred. This damage includes effects on crops and forests.

Most acid rain is caused by airborne deposits of sulphur dioxides and nitrogen oxides. Coal and oil-burning power plants are the biggest source of sulphur dioxides while nitrogen oxides come from car, truck - and ship - exhausts.

In 1979, a ministerial meeting on the protection of the environment, in Geneva, resulted in the signing of the Convention on Long-range Transboundary Air Pollution by 34 governments and the European Community. This was the first international legally binding instrument to deal with problems of air pollution on a broad regional basis.

Protocols to this Convention were later signed on reducing sulphur emissions (1985); controlling emissions of nitrogen oxides (1988); controlling emissions of volatile organic compounds (1991) and further reducing sulphur emissions (1994).

During the 1980s, concern over air pollution, such as global warming and the depleting of the ozone layer, continued to grow, and in 1987 the Montreal Protocol on substances that Deplete the Ozone Layer was signed. The Montreal Protocol is an international environmental treaty, drawn up under the auspices of the United Nations, under which nations agreed to cut consumption and production of ozone-depleting substances including chlorofluorocarbons (CFCs) and halons in order to protect the ozone layer. A Protocol was adopted in London in 1990 - amending the original protocol and setting the year 2000 as the target completion date for phasing out of halons and ozone-depleting CFCs. A second Protocol was adopted in Copenhagen in 1992, introducing accelerated phase-out dates for controlled substances, cutting short the use of transitional substances and the introduction of phase-out dates for HCFCs and methyl bromide(a pesticidal gas which depletes the ozone layer).

CFCs have been in widespread use since the 1950s as refrigerants, aerosol propellants, solvents, foam blowing agents and insulants. In shipping, CFCs are used to refrigerate ship and container cargo, insulate cargo holds and containers, air condition crew quarters and occupied areas and refrigerate domestic food storage compartments.

Halons, manufactured from CFCs, are effective fire extinguishers used in portable fire extinguishers and fixed fire prevention systems. [30]

IMO and air pollution

At IMO, the MEPC in the mid-1980s had been reviewing the quality of fuel oils in relation to discharge requirements in Annex I and the issue of air pollution had been discussed. In 1988, the MEPC agreed to include the issue of air pollution in its work programme following a submission from Norway on the scale of the problem.[31] In addition, the Second International Conference on the Protection of the North Sea, held in November 1987, had issued a declaration in which the ministers of North Sea states agreed to initiate actions within appropriate bodies, such as IMO, "leading to improved quality standards of heavy fuels and to actively

[30] MEPC 29/Inf 9 from FOEI

[31] MEPC 26/25 para 24.3

support this work aimed at reducing marine and atmospheric pollution."[32]

At the next MEPC session, in March 1989, various countries submitted papers referring to fuel oil quality and atmospheric pollution, and it was agreed to look at the prevention of air pollution from ships - as well as fuel oil quality - as part of the committee's long-term work programme, starting in March 1990.

In 1990, Norway submitted a number of papers to the MEPC giving an overview on air pollution from ships. The papers noted:

Sulphur emissions from ships' exhausts were estimated at 4.5 to 6.5 million tons per year - about 4 percent of total global sulphur emissions. Emissions over open seas are spread out and effects moderate, but on certain routes the emissions create environmental problems, including English Channel, South China Sea, Strait of Malacca.

Nitrogen oxide emissions from ships were put at around 5 million tons per year - about 7 percent of total global emissions. Nitrogen oxide emissions cause or add to regional problems including acid rain and health problems in local areas such as harbours.

[32] MEPC 26/24 Annex page 2

Emissions of CFCs from the world shipping fleet was estimated at 3,000-6,000 tons - approximately 1 to 3 percent of yearly global emissions. **Halon emissions** from shipping were put at 300 to 400 tons, or around 10 percent of world total. [33]

Discussions in the MEPC and drafting work by a working group, led to the adoption in 1991, of an IMO Resolution A.719(17) on ***Prevention of Air Pollution from Ships***.

The Resolution called on the MEPC to prepare a new draft Annex to MARPOL 73/78 on prevention of air pollution.

The new draft Annex was developed over the next six years - and was finally adopted at a Conference in September 1997. It was agreed to adopt the new Annex through adding a Protocol to the Convention, which included the new Annex. This enabled specific entry into force conditions to be set out in the protocol.

The Protocol of 1997 (Annex VI)

The Protocol and new Annex VI to MARPOL 73/78 will enter into force 12 months after being accepted by 15 states with not less than 50% of world merchant shipping tonnage.

The Conference also adopted a Resolution which invites IMO's Marine Environment Protection Committee (MEPC) to identify any impediments to entry into force of the Protocol, if the conditions for entry into force have not been met by 31 December 2002.[34] This proviso was aimed at ensuring that any problems in ratifying the annex could be ironed out to avoid excessive delays in the Annex coming into force.

Annex VI on Regulations for the Prevention of Air Pollution from Ships, when it comes into force, will set limits on sulphur oxide and nitrogen oxide emissions from ship exhausts and prohibit deliberate emissions of ozone depleting substances.

The annex includes a global cap of 4.5% m/m on the sulphur content of fuel oil and calls on IMO to monitor the worldwide average sulphur content of fuel once the Protocol comes into force.

Annex VI contains provisions allowing for special 'SOx Emission Control Areas' to be established with more stringent controls on sulphur emissions. In these areas, the sulphur content of fuel oil used onboard ships must not exceed 1.5% m/m. Alternatively, ships must fit an exhaust gas cleaning system or use any other technological method to limit SOx emissions. The Baltic Sea Area is designated as an SOx Emission Control area in the Protocol.

Annex VI prohibits deliberate emissions of ozone depleting substances, which include halons and chlorofluorocarbons (CFCs). New installations containing ozone depleting substances are prohibited on all ships. But new installations containing hydro-chlorofluorocarbons (HCFCs) are permitted until 1 January 2020.

Annex VI also sets limits on emissions of nitrogen oxides (NOx) from diesel engines. A mandatory NOx Technical Code,which defines how this shall be done, was adopted by the Conference under the cover of Resolution 2.

The Annex also prohibits the incineration onboard ship of certain products, such as contaminated packaging materials and polychlorinated biphenyls (PCBs).

Current status

Annex VI has to date (October 1998) been ratified by two countries.

Meanwhile, the MEPC has drawn up a programme of follow-up action towards implementation of Annex VI.

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[33] MEPC 29/18/4

[34] The Conference also adopted a Resolution which invites the MEPC to identify any impediments to entry into force of the Protocol, if the conditions for entry into force have not been met by 31 December 2002.

The Sub-Committee on Ship Design and Equipment (DE) has been instructed to develop guidelines relevant to implementation of the Annex VI, including, as a high priority, guidelines on sampling of fuel delivered for use onboard ships and guidelines for onboard nitrogen oxide monitoring and recording devices.

The Sub-Committee on Fire Protection (FP) is to review the use of perfluorocarbons (PFCs) in shipboard fire-extinguishing systems, in line with a conference resolution calling for their use to be prohibited. The FP Sub-Committee will seek to identify what uses of PFCs, if any, are essential for fire-extinguishing systems on commercial surface vessels, commercial submersibles and offshore platforms. In the Arctic and Antarctic sea areas, alternatives may not be suitable for use in sub-zero conditions.

The issue of carbon dioxide emissions from ships, and how to control them, as requested by the Kyoto Protocol of 1997 to the United Nations Framework Convention for Climate Change, is being discussed at MEPC, with a view to developing guidelines relevant to implementation of the Annex VI, including, as a high priority, guidelines on sampling of fuel delivered for use onboard ships and guidelines for onboard nitrogen oxide monitoring and recording devices.

Possible future Annexes to MARPOL 73/78

IMO's Marine Environment Protection Committee is currently working on two further issues which affect the marine environment. Draft regulations are being drawn up to prevent the spread of unwanted aquatic organisms in ballast water and to prohibit the use of toxic anti-fouling paints. Both issues may be dealt with by adding new Annexes to MARPOL 73/78 - although the MEPC may decide to propose that they are dealt with by independent Conventions.

Unwanted aquatic organisms in ballast water

Ballast water is used to stabilise ships when they have discharged their cargo and are sailing to pick up cargo at the next port. Over the years, ships have unwittingly carried hundreds of species across the oceans. Discharged into their non-native habitat, these species can cause havoc to the local ecosystem.

Examples include the European goby fish, which has been introduced into the Great Lakes in North America a voracious and aggressive fish which is damaging local native fish stocks. Kelp is farmed in Japan - but outside its native habitat it can choke coral and devastate the local ecosystem.

Dinoflagellates - microscopic organism - can cause paralytic shellfish poisoning in humans. South-east Asian dinoflagellates have been introduced into Australian waters, harming local shellfish industries.

The problem of alien species in ballast water was recognised in the early part of the 20th century, but it was not until the 1970s that it really began to be recognised as a problem.

The 1973 conference which adopted the first MARPOL Convention, adopted a Resolution which noted that "ballast water taken in waters which may contain bacteria of epidemic diseases, may, when discharged, cause a danger of spreading of the epidemic diseases to other countries". The Resolution requested IMO and the World Health Organization to "initiate studies on that problem on the basis of any evidence and proposals which may be submitted by governments". [35]

In the next decade, more and more alien species were being introduced - and being noticed - around the world. In the late 1980s, Canada and Australia were among countries experiencing particular problems with unwanted species, and they brought their concerns to the (MEPC).[36]

Ballast water guidelines 1991

In 1990, the MEPC at its 31st session set up a working group on ballast water, which developed guidelines on addressing the problem of alien species. An MEPC Resolution MEPC 50 (31) - ***Guidelines for Preventing the Introduction of Unwanted Organisms and Pathogens from Ships' Ballast Waters and Sediment Discharges*** - was adopted in 1991.

The Guidelines were aimed at providing Administrations and port State authorities with information on procedures to minimize the risks from the introduction of unwanted aquatic organisms from ships' ballast water and sediment.

The Guidelines were subsequently adopted as an Assembly Resolution A.774(18),while a revised version was adopted in 1997 as A.868(20). The revised version incorporates further recommendations on tackling the problem, including how to lessen the chances of taking onboard harmful organisms along with

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[35] Final Act of the International Conference on Marine Pollution 1973, Resolution 18

[36] A sub-committee of IMO's Maritime Safety Committee was set up following the **Torrey Canyon** disaster of 1967 to deal with environmental issues, but in 1975, the 9th Assembly adopted resolution A.358(IX) which formally established the Marine Environment Protection Committee (MEPC). The MEPC deals with all aspects of marine pollution and has the same status as the MSC. It is open to all IMO Member States and is usually attended by a number of environmental non-governmental organisations which have consultative status with IMO.

ballast water.

The recommendations include informing local agents and/or ships, of areas and situations where uptake of ballast water should be minimized, such as areas with known populations of harmful pathogens or areas near to sewage outlets. Ships should operate precautionary practices, through avoiding loading ballast water in very shallow water or in areas where propellers may stir up sediment. Unnecessary discharge of ballast water should also be avoided.

Procedures for dealing with ballast water include exchange of ballast water at sea and discharge to reception facilities, while the Guidelines note that in the future treatment using heat or ultraviolet light could become acceptable to port States.

The MEPC and Maritime Safety Committee have already approved guidance on safety aspects relating to the exchange of ballast water at sea, which outlines procedures for exchanging ballast water and point out safety issues which need to be considered, such as avoidance of over and under pressurization of ballast tanks and the need to be aware of weather conditions.

In March 1998, the MEPC approved a programme of work for the ballast water working group, which includes developing draft Regulations on ballast water management, expected to be adopted at a Conference of Parties to MARPOL 73/78. The Conference is scheduled to be held in the year 2000.

The Regulations will probably make it compulsory for ships to choose between exchanging their ballast water in mid-Ocean, where they are less likely to pick up sea life, discharging ballast water into special reception facilities or using some other method to kill off any alien life forms carried in the ballast water.

Toxic anti-fouling paints

Antifouling paints are used to coat the bottoms of ships to prevent sealife such as algae and molluscs attaching themselves to the hull - thereby slowing down the ship and increasing fuel consumption. In the early days of sailing ships, lime and later arsenic was used to coat ships' hulls, until the modern chemicals industry developed effective antifouling paints using metallic compounds.

But underwater marine life can be harmed by these products. The compounds slowly "leach" into the sea water, killing barnacles and other marine life that have attached themselves to the ship . But studies have shown that these compounds persist in the water, killing sealife, harming the environment and possibly entering the food chain. One of the most effective antifouling paints, developed in the 1960s, contains the organotin tributyl tin (TBT), which has been proven to cause deformations in oysters and sex changes in whelks.

MEPC's interest in the anti-fouling paints issue goes back to 1988, when at its twenty-sixth session, the Paris Commission requested IMO to consider the need for measures under relevant legal instruments to restrict the use of tributyl tin (TBT) compounds on seagoing vessels in order to supplement the measures that had been taken in other fora to eliminate pollution from such compounds.

By this time there was unequivocal evidence worldwide that TBT and other organotin compounds were harmful to aquatic organisms. Based on the results from organotin assessment studies, a number of Governments either individually or under regional agreements adopted measures to reduce the harmful effects of the use of TBT based anti-fouling paints.

It was recognized, however, that, in order to tackle this problem, an international measure to regulate the use of anti-fouling paints would need to be developed. In April 1990, the Third International Organotin Symposium held in Monaco recognized that the IMO was the appropriate body to regulate the use of organotin compounds internationally.

In 1990, the MEPC adopted a resolution (MEPC.46(30) which recommended that Governments adopt measures to eliminate the use of antifouling paint containing TBT on non-aluminium hulled vessels of less than 25 metres in length and eliminate the use of antifouling paints with a leaching rate of more than 4 microgrammes of TBT per day. Some countries, such as Japan, have already banned TBT in antifouling paint for most ships.

In the sessions that followed, the MEPC was presented with TBT monitoring study results which reconfirmed the toxicity of these compounds to marine organisms and highlighted the effectiveness of control measures in reducing the concentration of TBT in both the water column and tissues of aquatic organisms. The Committee was also presented with information on existing alternative anti-fouling paint systems, including their effectiveness and the risk posed to the aquatic environment by these systems.

As a result, the MEPC in 1996 established a Correspondence Group which reviewed current research and looked into the possibility of drafting regulations to phase out the use of TBT acting as a biocide

in anti-fouling systems.

In March 1998, the MEPC agreed to establish a Working Group to begin drafting mandatory regulations to ban TBT in biocides in anti-fouling systems. It is likely that these regulations would be adopted at a Conference after the year 2000.

Alternatives to TBT paint include copper-based coatings and silicon-based paints, which make the surface of the ship slippery so that sealife will be easily washed off as the ship moves through water. Further development of alternative anti-fouling systems is being carried out. Underwater cleaning systems avoid the ship having to be put into dry dock for ridding the hull of sealife, while ultrasonic or electrolytic devices may also work to rid the ship of foulants.

MARPOL 73/78 - Conclusions

The adoption of the MARPOL Convention in 1973 was an important step in focusing the shipping industry's attention on the environment. It was no longer enough just to ensure goods and people were transported safely - consideration for the environment was now on the agenda.

In part, this reflected greater awareness worldwide of the impact of an increasingly industrialised world on the environment - and it is clear that the Convention was also in a sense a global political response to incidents such as the **Torrey Canyon** disaster.

In 1973, the Convention was extremely ambitious - and time showed that some of its aims did prove to be technically difficult to achieve and to convert into practicable regulations that Parties to the Convention could implement into their national legislation.

After the 1978 conference on Tanker Safety and Pollution Prevention, which both strengthened provisions for tanker safety and removed the obstacles that were preventing the entry into force of the Convention (mainly related to technical provisions in Annex II), the twin aims of "Safer shipping and cleaner oceans" became the dual objective of IMO's work.

When MARPOL 73/78 entered into force in 1983 it proved that countries were prepared to implement measures to protect the marine environment.

Today, MARPOL is recognised as the most important set of international regulations for the prevention of marine pollution by ships and figures show that marine pollution has declined over the years.

According to the environmental group Greenpeace, 77 percent of all polluting substances in the marine environment come from human land-based activities, while shipping and dumping at sea are thought to contribute to the remainder. [37]

There are still concerns over pollution entering the world's oceans - and the key to preventing this is implementation of IMO Conventions.

IMO is focusing on this through its Committees and Sub-Committees, and through its Technical Cooperation programme, which aims to assist developing countries in developing the infrastructure and trained personnel necessary to achieve ratification and implementation of the international regulations.

Besides MARPOL, IMO's safety related Conventions are also crucial elements in helping prevent accidents - and therefore helping prevent marine pollution.

These include:

International Convention for the Safety of Life at Sea (SOLAS), 1974
International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978
International Convention on Load Lines (LL), 1966
Convention on the International Regulations for Preventing Collisions at Sea (COLREG), 1972
International Convention on Salvage (SALVAGE), 1989

Other conventions which relate to pollution concerns include:

International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (INTERVENTION), 1969
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (LDC), 1972
International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC), 1990
International Convention on Civil Liability for Oil Pollution Damage (CLC), 1969
International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND), 1971
International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS), 1996

[37] Greenpeace Report on the World's Oceans. See LC\20\8-1 p2

Other important contributions to preventing marine pollution include port State control, the introduction of the International Safety Management Code and the 1995 amendments to the 1978 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW)

Port State control

Many of IMO's most important technical conventions contain provisions for ships to be inspected when they visit foreign ports to ensure that they meet IMO requirements. These inspections were originally intended to be a back up to flag State implementation, but experience has shown that they can be extremely effective, especially if organized on a regional basis. A ship going to a port in one country will normally visit other countries in the region before embarking on its return voyage and it is to everybody's advantage if inspections can be closely co-ordinated.

This ensures that as many ships as possible are inspected but at the same time prevents ships being delayed by unnecessary inspections. IMO has encouraged the establishment of regional port State control organizations in many parts of the world including Europe and North America, Asia and the Pacific, Latin America, the Indian Ocean the Mediterranean, and the Caribbean. Ultimately it is expected that all regions will be covered, perhaps leading to the creation of a global system which will make it virtually impossible for sub-standard ships to escape detection.

The ISM Code

the International Safety Management Code became mandatory for passenger ships, oil and chemical tankers, bulk carriers, gas carriers and cargo high speed craft of 500 gross tonnage and above on 1 July 1998 and is extended to other ships in 2002.

The Code is aimed at ensuring that ships are properly managed and operated - the objectives, stated clearly in the Code, are to "ensure safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, in particular to the marine environment and to property".

The shipowner or other person with responsibility for the operation of the ship must develop, implement and maintain a safety management system, which includes a safety and environmental-protection policy and ensure compliance with mandatory rules and regulations.

The ISM Code is not intended to be just paperwork - if it is properly implemented onboard a ship then procedures will be in place for every eventuality. If an incident does occur, everyone onboard will be prepared for it and loss of life and damage to the environment will be minimised.

The ISM Code is an example of the shift in emphasis towards what is sometimes called the human factor. If the people operating and managing a ship follow the rules, then there should be no deliberate polluting of the marine environment. Operational pollution - such as from bunkering operations - should not happen if all procedures are followed correctly.

If an accident does occur - then its effects will be minimised if the people involved are prepared for that eventuality.

STCW Convention

The human factor is also being addressed by the 1995 amendments to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). These amendments, which updated and completely revised the Convention, entered into force in February 1997. By 1 August 1998, all Parties to the Convention had to submit documentation to IMO showing that their training institutions complied with the requirements of the revised Convention.

IMO is now reviewing the information, with the help of competent person nominated by Parties to the Convention, and a list of countries in full compliance with the Convention will be published. This is significant, because it is the first time that IMO has been given the role of verifying compliance with a Convention.

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